

КЛУЧ/ИНОВ. Н.О.

Device for checking the pitch of worm hobs. Stan. 1 instr. 31  
no. 9:38 8 '60. (MIRA 13:9)

(Gauges)

25083

S/081/61/000/010/019/029  
B117/B206

18 8310

AUTHORS:

Gasanov, B. G., Kiyuchnikov, N. G.

TITLE:

Effect of ethanolamines on some nonferrous and ferrous metals

PERIODICAL:

Referativnyy zhurnal. Khimiya, no. 10, 1961, 250, abstract 10W238 (10I238). ("Uch. zap. Mosk. gos. ped. in-ta im. V.I. Lenina", no.146, 1960, 170-175)

TEXT: It is stated that ethanolamine used as corrosion inhibitor for ferrous metals attacks nonferrous metals (Cu, Co) by forming with them complexes of the following type:  $\text{Cu}(\text{H}_2\text{NCH}_2\text{CH}_2\text{OH})_4 \text{CO}_3 \cdot 5\text{H}_2\text{O}$ . With ethanolamine in the presence of atmospheric oxygen, Fe produces a compound of the following composition:  $[\text{Fe}(\text{H}_2\text{NCH}_2\text{CH}_2\text{OH})_3] (\text{OH})_3$  which is only stable in the absence of humidity. Abstracter's note: complete translation.

Card 1/1

1.1800 2808 2208 1045

25735

9/123/61/000/012/020/042

A004/A101

AUTHOR: Klyuchnikov, N. O.

TITLE: Volumetric changes of steel specimens after thermal chrome plating and the dependence of these changes on the nature of the reactions taking place

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 12, 1961, 84, abstract 12B599 ("Uch. zap.") Mosk. gos. ped. in-ta im. V. I. Lenina", 1960, no. 146, 234-246)

TEXT: The author determined dimensional changes and increase in weight of specimens made of carbon steel during the chrome plating in ferrochrome powder with an addition of 1% chromium chloride and ammonium chloride at 950°C for 4 hours. Two parallel processes are taking place during this chrome-plating method: the direct application of chromium resulting in a dimensional increase of the specimen, and the application of chromium as a result of the exchange reaction of chromium chloride with iron resulting in a dimensional decrease of the specimen. There are 9 references.

N. Il'ina

[Abstracter's note: Complete translation]

Card 1/1

18.1200

S/137/61/000/005/010/060  
A006/A106

AUTHOR: Klyuchnikov, N.G.

TITLE: Preparation of various alloys by the metallothermal method. Information I. On the limits of using aluminothermal reactions

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 5, 1961, 30, abstract 50225 ("Uch. zap.] Mosk. gos. ped. in-ta im. V.I. Lenina", 1960, no. 146, 247 - 254)

TEXT: Al is mostly used for the metallothermal preparation of metal. It is well suitable for the reduction of many oxides (such as  $\text{CrO}_3$ ,  $\text{MnO}_2$ ,  $\text{MoO}_3$  etc). However, a number of oxides (e.g.  $\text{Cr}_2\text{O}_3$ ,  $\text{TiO}_2$ ,  $\text{ZrO}_2$ , etc) can not be directly reduced with Al. If an easy reducible oxide is added to the aforementioned oxides, the reaction takes place and the corresponding alloy is obtained. Calculation formulae are presented making it possible to determine the least amount of easy-reducible oxide required in the charge, and the maximum amount of hard-reducible metal attainable in alloys obtained by the aluminothermal method.

G.S.

[Abstracter's note: Complete translation]

Card 1/1

✓B

18.1235

S/137/61/000/005/011/060  
A006/A106

AUTHOR: Klyuchnikov, N.G.

TITLE: Preparation of various alloys by the metallothermal method. Information II. Preparation of chromium and its bi-component alloys by the aluminothermal method

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 5, 1961, 30, abstract 50226 ("Uch. zap.] Mosk. gos. ped. in-ta im. V.I. Lenina", 1960, no. 146, 255 - 262)

TEXT: An investigation was made of the aluminothermal preparation of bi-component alloys of Cr with Mn, Mo, Co, Ni, Fe, V and Cu. Calculational data are presented on the determination of the minimum amount of easy reducible oxide required in the charge. It is pointed out that calculational data on the composition of the charge are in a satisfactory agreement with experimental results. Deviations from the calculations are observed during the evaporation and decomposition of the oxides in the case when the heat capacity of reaction products is strongly different from the considered mean value. There are 30 references. [Abstracter's note: Complete translation] U.S.

Card 1/1

18.12.85

8/137/61/000/005/012/060  
A006/A106

AUTHOR: Klyuchnikov, N.G.

TITLE: Preparation of various alloys by the metallothermal method. Information III. Aluminothermal preparation of bi-component titanium alloys

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 5, 1961, 30, abstract 50227 ("Uch. zap." Mosk. gos. ped. in-ta im. V.I. Lenina", 1960, no. 146, 263 - 272)

TEXT: An investigation was made of the aluminothermal preparation of Ti alloys with Cr, Fe, Co, Ni, Cu, Mn, Mo and V. The minimum amount of an easy reducible oxide required in the charge can be calculated theoretically. The calculated data are basically in agreement with experimental results; in individual cases the deviations are 4 - 6%. There are 20 references.

O.S.

[Abstracter's note: Complete translation]

Card 1/1

POPOVA, L.F.; KLYUCHNIKOV, N.G.

Preparation of various glasses in the laboratory. Khim. v shkole  
15 no.2:82-85 Mr-Apr '60. (MIRA 14:5)

1. Kafedra obshchey khimii Moskovskogo gosudarstvennogo pedagogicheskogo instituta imeni V.I.Lenina,  
(Glass)

18.8340

33851

S/137/62/000/001/198/237  
A006/A101

AUTHORS: Gasanov, B. G., Klyuchnikov, N. G.

TITLE: Changes in the electrode potentials of iron, cobalt, nickel, and copper in monoethanolamine in the presence of some oxidizers

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 1, 1962, 86, abstract 11604 ("Tr. In-ta khimii. AN AzerbSSR," 1961, v. 19, 97-106, Azerb. summary)

TEXT: When studying changes in electrode potentials of 20 grade steel, Co, Ni and Cu in monoethanolamine solutions (I) in the presence of oxidizers ( $O_2$ ,  $H_2O_2$ ,  $K_2Cr_2O_7$ ) the following facts were established by the potentiometric method: I is not oxidized by the action of  $H_2O_2$  and  $O_2$ . The effect of I on the metals results in the summary effect of the inhibitor and  $H_2O_2$ , which entails abrupt changes in the potential to the positive side. The diffusion of these metals in I, in the presence of  $H_2O_2$ , is practically not different from the diffusion of these metals in the presence of  $O_2$ . Changes in the potential when  $K_2Cr_2O_7$  is added to I, can be explained by the fact, that I due to its alkaline properties converts the  $Cr_2O_7^{2-}$  ion into a  $CrO_4^{2-}$  ion, forming on the metal

Card 1/2



KLYUCHNIKOV, N.G. (Moskva)

Chemical activity and chemical affinity. Khim. v shkole 16  
no.2:8-16 Mr-ap '61. (MIRA 14:7)  
(Chemical affinity)

54800

29411

S/081/61/000/017/006/166  
B102/B138

AUTHOR: Klyuchnikov, N. G.

TITLE: Determination of thermodynamic constants of a substance from the number of the element in Mendeleev's periodic system. Communication I. Heat of formation of oxides

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 17, 1961, 44 - 45, abstract 176311 (Mosk. gos. ped. in-ta im. V. I. Lenina, no. 146, 1960, 228 - 233)

TEXT: A calculation is proposed for the enthalpy of formation of substances ( $\Delta H$ , kcal/g-equiv.) using the formula  $\Delta H = a + bN$ , where  $N$  is the number of the element in the periodic system,  $a$  and  $b$  are constants for compounds of one type. The enthalpies of oxide formation of several elements are calculated and compared with experimental values. Differences between calculated and experimental values range from a few to some tens percent. The formation enthalpy is also calculated for some hypothetical oxides (such as the oxides of the hypothetical elements nos. 104 - 108).  
[Abstracter's note: Complete translation.]

Card 1/1

GASHEV, P.C.; SHCHERBAKOV, P.C.

Change of electrode potentials of iron, cobalt, nickel, and copper in perchloric acid in the presence of some oxidizing agents. Trudy Inst. Khim. Akad. SR 1957-107 '61.

(CIRA 14:10)

(Metals. Electric properties)  
(Shtatol)

251.8  
S/078/62/007/004/003/016  
B110/B101

1.1/1.1  
AUTHORS: Tunina, M. I., Klyuchnikov, N. G.

TITLE: Interaction of iron with  $\text{SiCl}_4$

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 4, 1962, 743-748

TEXT: Siliconising of steel-10 by thermodiffusion was studied chemically.  $\text{SiCl}_4$  vapor was passed over steel plates (42 x 9 x 2 mm) placed in quartz tubes heated to 800-1200°C. Purified electrolytic hydrogen or purified argon was used as a carrier. The flask with  $\text{SiCl}_4$  was placed into thermostat heated to 25°C. Elementary Si was introduced into the reaction tube so as to clarify the part played by Si during siliconising. The experiments lasted for 3 hrs. The amount of  $\text{SiCl}_4$  (1.3 liter) was calculated from the carrier gas amount passed through and the  $\text{SiCl}_4$  vapor pressure at the corresponding temperature. Results: (1) silicon may penetrate into the steel owing to an exchange reaction between Fe and Si; (2) Si may directly penetrate without Fe substitution. Heating of a steel plate with  $\text{SiCl}_4$  at 1000° for 3 hrs caused a loss in weight of 0.4042 g and penetration of 0.1321 g Si. Since the condensate in the tube consists of ferrous chloride

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S/078/62/007/004/003/016  
B110/B101

# Interaction of iron with $\text{SiCl}_4$

only and chlorine is absent in the waste gases, the reaction  $\text{SiCl}_4 + 2 \text{Fe} = 2\text{FeCl}_2 + \text{Si}$  takes place. When heating at Pt plate at  $1200^\circ\text{C}$  for 3 hrs in the  $\text{SiCl}_4\text{-H}_2$  stream, a weight increase occurred owing to direct Si penetration resulting from  $\text{SiCl}_4$  reduction by atomic hydrogen formed in the Pt:  $\text{SiCl}_4 + 4\text{H} = \text{Si} + 4\text{HCl}$ . Fe samples coated with electrolytic iron were heated for 3 hrs at  $900^\circ\text{C}$  in the  $\text{SiCl}_4$  stream. Since a large weight increase took place, the electrolytic hydrogen effected the direct Si penetration without Fe substitution. The Si percentage in the sample resulting from the exchange reaction is:  $C_1 = (A-k) \cdot 100/3.97A$ , that of the Si amount penetrated directly without Fe substitution is:  $C_2 = (k+A \cdot 2.97) \cdot 100/3.97A$ , where A is the total amount of penetrated Si and k is the change in weight. Maximum loss in weight produced siliconizing in the presence of inert gas and silicon. Substitution of Ar by  $\text{H}_2$  lowered the contribution of the exchange reaction and the loss in weight. Introduction of Si into the reaction tube lowered the loss in weight considerably by increasing the directly penetrating Si amount. Substitution of hydrogen by argon effects an increase of the Si penetrating by exchange. Pure  $\text{SiCl}_4$  without diluting gas causes only exchange reaction. Ar and Si admixture effects direct Si penetration,

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Interaction of iron with  $\text{SiCl}_4$

S/078/62/007/004/003/016  
B110/B101

since no reduction of  $\text{SiCl}_4$  by  $\text{H}_2$  takes place. Presumably the reaction proceeds as follows:  $\text{SiCl}_4 + \text{Si} \rightleftharpoons 2\text{SiCl}_2$ ,  $2\text{SiCl}_2 \rightleftharpoons \text{SiCl}_4 + \text{Si}$ . The interface (Fe surface) acts here as a catalyst. The separated Si diffuse into the iron. Temperature increase always causes an increase of the Si penetrating by exchange, which may be attributed to an increase of  $\text{FeCl}_2$  volatility and of the diffusion rate of elementary Si in Fe. The decrease of the directly penetrating Si with increasing temperature is explained by the decrease of hydrogen solubility in Fe. Maximum Si saturation of the siliconized layer was found in  $\text{H}_2$  atmosphere in the presence of Si. Heating of samples at 800-1200°C for 3 hrs in  $\text{SiCl}_4$ - $\text{H}_2$  atmosphere in the presence of Si produced 14-16% saturation, sometimes 21%, in the absence of Si, 11-13.5%. Substitution of  $\text{H}_2$  by Ar lowered the saturation of the layer to 8-11%. There are 5 figures and 1 table.

SUBMITTED: March 20, 1961

Card 3/3

GASANOV, B.G.; KLYUCHNIKOV, M.G.

Effect of ethanolamines on certain ferrous and nonferrous metals.  
Uch. zap. MGPI: no. 146:170-175 '60. (MIRA 15:4)  
(Corrosion and anticorrosives) (Ethanol)

KLYUCHNIKOV, N.G.

Determination of thermodynamic constants of substances on the  
basis of their order number in D.I.Mendeleev's Periodic System.  
Uch. zap. MGPI no.146:228-233 '60, (MIRA 15'4)  
(Metallic oxides--Thermal properties) (Periodic law)



KLYUCHNIKOV, N.G.

Preparation of various alloys by metallothermy. Report no.1:  
Limits in the use of aluminothermic reactions. Uch. zap. MGPI  
no.146:247-254 '60. (MIRA 15:4)  
(Alloys--Metallurgy) (Aluminothermy)

KLYUCHNIKOV, N.O.

Preparation of various alloys by metallothermy. Report no.2:  
Preparation of chromium and its two-component alloys by  
aluminothermy. Uch. zap. MGPI no.146:255-262 '60. (MIRA 15:4)  
(Chromium alloys--Metallurgy) (Aluminothermy)

KLYUCHNIKOV, N.G.

Preparation of various alloys by metallogthermy. Report no.3:  
Aluminotharmy for the preparation of two-component titanium  
alloys. Uch. zap. MGPI no.146:263-272 '60. (MIRA 15:4)  
(Titanium alloys--Metallurgy) (Aluminotharmy)

TUNINA, M.I.; KLYUCHNIKOV, M.G.

Reaction of iron with silicon tetrachloride. Zhur.neorg.khim.  
7 no.4:743-748 Ap '62. (MIRA 15:4)  
(Iron) (Silicon chlorides)

BESKOV, Sergey Dmitriyevich, prof.; BELOTSVETOV, Aleksey Vasvolodovich;  
KLYUCHNIKOV, Nikolay Grigor'yevich; SLAVIN, David Osipovich;  
METEL'SKAYA, G.S., red.; ZAYTSEVA, E.F., red. kart; MAKHOVA,  
N.N., tekhn. red

[Principles of chemical technology] Osnovy khimicheskoi tekhnologii;  
posobie dlia studentov pedagogicheskikh institutov. [By] S.D.  
Beskov i dr. Izd.2., ispr. i dop. Moskva, Uchpedgis, 1962. 406 p.  
(MIRA 16:1)

(Chemistry, Technical)

ACCESSION NR: AR4015643

S/0081/63/000/022/0373/0373

SOURCE: RZh. Khimiya, Abs. 22K107

AUTHOR: Zasyapkina, V. S.; Klyuchnikov, N. G.

TITLE: Determination of the minimal breakdown voltage on protective coatings

CITED SOURCE: Uch. zap. Mosk. gos. ped. in-ta im. V. I. Lenina, no. 181, 1962, 87-93

TOPIC TAGS: breakdown voltage, corrosion, corrosion resistance, protective coating, protective coating breakdown, steel

TRANSLATION: The authors studied the formation of protective coatings on steel -20 in the presence of certain inhibitors by determining the minimal breakdown voltage. The data show that, in the early stages of the formation of the protective coating, the concentration of the inhibitor plays an important role. In the later stages, no differences in concentration were found. The time necessary for testing the protective coating also does not change. It was shown that the most resistant coatings under investigation contained nitrate ions, chromium ions,

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ACCESSION NR: AB4015643

and organic amines of the dicyclohexylamine nitrite and hexamethylenediamine chromite types. A linear relationship in the process of formation of the protective coating was discovered in the solutions investigated at low inhibitor concentrations. It is obvious from the experiments that the formation of the protective coating essentially ends when the samples have been in the inhibitor solution for 30 minutes. Practically no changes were observed in the value of the minimal breakdown voltage. 7 references. Authors' summary.

DATE ACQ: 07Jan64

SUB CODE: ML, CH

ENCL: 00

Card 2/2

KLYUCHNIKOV, N.O.; NOVOSHINSKAYA, N.S.

Protective action of sodium adipate and dibutyl ester of  
adipic acid. Zhur. prikl. khim. 36 no.11:2470-2474 N '63.  
(MIRA 17:1)

1. Moskovskiy gosudarstvennyy pedagogicheskii institut imeni  
Lenina.



ACCESSION NR: AR4015694

S/0081/63/000/023/0355/0355

SOURCE: RZh. Khimiya, Abs. 23186

AUTHOR: Novoshinskaya, M. S.; Kiyuchnikov, N. G.

TITLE: The protection of steel in water by the salts of certain dicarboxylic acids

CITED SOURCE: Uch. zap. Mosk. gos. ped. in-t im. V. I. Lenina, no. 181, 1962, 20-27

TOPIC TAGS: corrosion, corrosion inhibitor, steel corrosion, sodium adipate, sodium malonate, sodium oxalate, iron oxide

ABSTRACT: Among the sodium salts of the dicarboxylic acids, the highest protective power with respect to steel-20 in distilled  $H_2O$  is shown by sodium adipate. Na-malonate has less protective activity, followed by Na-oxalate. The protective concentrations in distilled  $H_2O$  for 90 hrs. are 0.0001 M for Na-adipate, 0.05 M for Na-malonate and 0.1 M for Na-oxalate. With an increase in the chain length of Na salts of dicarboxylic acids on a  $CH_2$  group, the protective properties increase. Electronographic studies of the steel surface showed that in protective concentrations of the Na salts of dicarboxylic acids, a film of  $\gamma-Fe_2O_3$  is formed. Elec-  
Card 1/2

ACCESSION NR: AR4015693

S/0081/63/000/023/0355/0355

SOURCE: RZh. Khimiya, Abs. 23K85

AUTHOR: Zasyapkina, V. S.; Kiyuchnikov, N. G.

TITLE: Formation of a protective film on steel in the presence of dicyclohexylamine nitrite

CITED SOURCE: Uch. zap. Mosk. gos. ped. in-t im. V. I. Lenina, no. 181, 1962, 42-48

TOPIC TAGS: corrosion, corrosion inhibitor, steel corrosion, protective film, dicyclohexylamine nitrite

ABSTRACT: The effect of vapors of dicyclohexylamine nitrite on the process of formation of a protective film on steel-10 and 45 was studied by an optical method. It was found that the vapors decreased the thickness of the natural loose oxide film and transformed it to a more stable state. An electronographic study of the steel surface in an atmosphere of dicyclohexylamine nitrite vapors showed that a magnetic oxide of iron,  $Fe_3O_4$  or  $\gamma-Fe_2O_3$ , is formed on the steel surface. The vapor phase of the inhibitor protects the steel only when the natural oxide film is present on its surface. In its absence and also in the absence of oxygen

Card 1/2

ACCESSION NR: AR4015693

It produces corrosion of the steel. 23 refs. Authors' summary

DATE ACQ: 09Jan64

SUB CODE: MM

ENCL: 00

Card 2/2

ACCESSION NR: AR4015665

S/0061/63/000/023/0354/0354

SOURCE: RZh. Khimiya, Abs. 23K78

AUTHOR: Zasyadina, V. S.; Klyuchnikov, N. G.

TITLE: Electrochemical studies on the interaction of certain inhibitors with iron, cobalt, nickel and copper

CITED SOURCE: Uch. zap. Mos. gos. ped. in-tim. V. I. Lenina, no. 181, 1962, 108-115

TOPIC TAGS: electrochemistry, iron electrode, cobalt electrode, nickel electrode, copper electrode, cyclohexylamine, sodium nitrite, ethanolamine, corrosion, corrosion inhibitor

TRANSLATION: Electrochemical measurements show that the inhibitors being investigated (dicyclohexylamine nitrate, cyclohexylamine,  $\text{NaNO}_2$ , monoethanolamine, monoethanolamine, benzoate) have a special effect on the anodic process, retarding its speed. Measurements of the electrode potential on steel-20 in a stream of hydrogen and in the absence of an oxide film on the metal surface show that these inhibitors stimulate the process of formation

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ACCESSION NR: AR4018688

of a protective film on the metal surface only in the presence of atmospheric oxygen. The shape of the polarization curves for electrodes from steel-20 and natural magnetite coincide, which indicates the structural and compositional similarity of the surface film created in both cases by the electrochemical processes at the metal-electrolyte boundary. 10 refs. from the summary.

SUB CODE: OC, MM

DATE ACQ: 09Jan64

ENCL: 00

Card 2/2

BERDOLISOV, Sergey Serafimovich; VLASOV, Lev Grigor'yevich;  
NESMEYANOV, An.N., doktor khim. nauk, prof., retsenzent;  
KLYUCHNIKOV, N.G., kand. khim. nauk, dots., retsenzent;  
PETEL'SKAYA, G.S., red.

[Application of radioisotopes; a textbook for teachers]  
Primenenie radioaktivnykh izotopov; posobie dlia uchite-  
lei. Moskva, Prosveshchenie, 1964. 117 p.

(MIRA 18:9)

KLYUCHNIKOV, Nikolay Grigor'yevich; BELOTSVETOV, A.V., dots.,  
retsensent; BAULINA, V.V., red.

[Practical work in chemical technology] Prakticheskie  
zaniatiia po khimicheskoi tekhnologii. Izd.3., perer.  
Moskva, Prosveshchenie, 1965. 262 p. (MIRA 18:6)

L 3782-66

ACCESSION NR: AP5014137

ENT(m)/EMP(c)/ENP(j)/T/EMP(t)/ENP(b) IJP(c) JD/W4/W3/RM

UR/0365/63/001/003/0330/0334

621.794.4

620.197.3

AUTHOR: Klyuchnikov, N. G.; Kipriyanov, N. A.; Laykhter, L. B.; Fateyev, V. D.;  
Shadrina, N. I.

TITLE: Investigation of the effect which various inhibitors have on the dissolution of iron oxides

SOURCE: Zashchita metallov, v. 1, no. 3, 1965, 330-334

TOPIC TAGS: corrosion, corrosion rate, corrosion inhibitor, iron oxide

ABSTRACT: The authors study the dissolution of iron oxides in mineral acids as well as in solutions of substances which form complex compounds with iron (citric acid and ammonium citrate) for eliminating slag in boilers at thermal electric power stations. Samples of ferrous oxides and mixed iron oxides were prepared by sintering powdered oxides in an argon atmosphere at 1200-1300°C. Ferric oxide specimens were sintered in air at 1300°. The specimens were cylindrical with a surface area of ~7 cm<sup>2</sup>. The inhibitors used were: BA-6 (a product of condensation of benzylamine and urotropin); PB-5 (a product of condensation of urotropin and ani-

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ACCESSION NR: AP5014137

line); I-1-A, which is a byproduct of the manufacture of 2-methyl-5-ethyl pyridine; "CHM" put out by Soviet Industry according to Technical Specifications MNP-521-54; a mixture of potassium iodide and urotropin; Katapin-A (paradodecylbenzylpyridinium chloride); and Katapin-K. Graphs and tables of the results are given. In most cases, the inhibitors retard the action of hydrochloric acid on both ferrous and ferric oxides. The rate of dissolution of FeO is increased only by I-1-A in 3N HCl and BA-6 in 7N HCl. In 1N and 2N mixtures of hydrochloric and sulfuric acids, the rate of dissolution of FeO is reduced or somewhat increased by the presence of inhibitors. In a 5N mixture of these acids with a high content of hydrochloric acid, the stimulating effect of the inhibitors reaches a maximum, and diminishes in 7N acids. Dissolution of Fe<sub>2</sub>O<sub>3</sub> is retarded by inhibitors in all concentrations of sulfuric-hydrochloric acid mixtures studied. Certain concentrations of BA-6 inhibitor in hydrochloric acid and in a hydrochloric-sulfuric mixture accelerate the dissolution of FeO, and have the least effect on retardation of Fe<sub>2</sub>O<sub>3</sub> dissolution in comparison with the other inhibitors. At the same time, BA-6 is the most effective agent for retardation of steel dissolution in these media. FeO and Fe<sub>2</sub>O<sub>3</sub> dissolve faster in a solution of ammonium monocitrate than in solutions of citric acid. The most effective inhibitor for steel dissolution in citric acid and in ammonium citrate solutions is an additive of 0.1% Katapin and 0.01% Captax. This

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ACCESSION NR: AP5014137

mixture is also quite effective in retarding the dissolution of FeO. Orig. art.  
has: 4 figures, 3 tables.

ASSOCIATION: Moskovskiy gosudarstvennyy pedagogicheskiy institut im. V. I. Lenina  
(Moscow State Pedagogical Institute)

SUBMITTED: 25Dec64

44.5  
ENCL: 00

SUB CODE: NN

NO REF SOV: 000

OTHER: 000

PC  
Card 3/3

KLYUCHENIKOV, N.O.; TSVENKO, V.I., red.

[Manual on inorganic synthesis] Rukovodstvo po neorganicheskomu sintezu. Izd. 2., perer. Moskva, Khimiia, 1965.  
389 p. (MIRA 18:12)

KLYUCHNIKOV, N.I.; BIKBULATOV, A.G.

Main results of prospecting for oil and gas in Bashkiria during  
the first five years of the seven-year plan and prospects for  
future development. Geol. nefti. i gaza 8 no.10:1-7 O '64.  
(MIRA 17:12)

1. Bashneft'.

L 01631-66 BT(1)/BT(2)/BT(3)/BT(4)-2/BN(1)/BT(2)-2/2: (t)/BT(2) 13/01/AT

13P(c)

ACCESSION NR: AP5020609

UR/0294/65/003/004/0645/0648

73  
40  
B

AUTHOR: Belov, V. A.; Klyuchnikov, N. I.

TITLE: Collision integrals for the lithium-hydrogen system. Viscosity of mixtures of lithium-hydrogen

SOURCE: Teplofizika vysokikh temperatur, v. 3, no. 4, 1965, 645-648

TOPIC TAGS: collision integral, lithium hydrogen, gas viscosity, plasma physics, ionized plasma

ABSTRACT: In the calculation of the kinetic coefficients of rarefied gases, use is made of collision integrals  $\Omega_{ij}^{(n)}$ . The present article gives calculations of the integrals

$$\Omega_{Li-H}^{(1,2)} \cdot \Omega_{Li-Li}^{(1,2)} \cdot \Omega_{H-H}^{(1,2)} \cdot \Omega_{Li-H}^{(1,2)} \cdot \Omega_{Li-H}^{(1,2)} \cdot \Omega_{Li-H}^{(1,2)}$$

and the viscosity of a weakly ionized plasma in the temperature interval 1000-10,000 K, and at pressures of 1, 10, 10<sup>2</sup>, 10<sup>5</sup> newtons/m<sup>2</sup>. Calculations were also made for mixtures of lithium and hydrogen based on the obtained experimental

Card 1/2

*Klyuchikov, N. Ye.*  
AUTHOR: Klyuchikov, N. Ye.

130-10-14/18

TITLE: Looking After the Life of Elektro-metallurgists (Zabota o  
byte elektrometallurgov)

PERIODICAL: Metallurg, 1957, No.10, pp. 30 - 31 (USSR).

ABSTRACT: The author describes housing and amenity arrangements at  
the "Dneprospetsstal'" Works. A photograph of the water sport  
centre and one of a dwelling house are given.

ASSOCIATION: "Dneprospetsstal'" Works (Zavod "Dneprospetsstal'")

AVAILABLE: Library of Congress  
Card 1/1

<sup>Y</sup>  
KLUCHNIKOV, S. I.

O kachestve shtampovannoi poverkhnosti. (Vestn. Mash., 1948, no. 4,  
p. 51-56)

(Quality of the stamped surface.)

DLC: TM4.V4

SO: Manufacturing and Mechanical Engineering in the Soviet Union,  
Library of Congress, 1953.

KLIVCHNIKOV, S. I.

Kholodnaya kovka v shtampakh. (Vestn. Mash., 1948, no 7, p. 31-36)

(Cold die stamping.)

DLC: TM4.V4

SO: Manufacturing and Mechanical Engineering in the Soviet Union,  
Library of Congress, 1953.



KLUCHNIKOV, S. I.

Tochnaia shtampovka. Moskva, Mashgiz, 1949. 280 p. illus.

Bibliography: p. (279)

(Precision stamping.)

DEC: TS253.K55

SO: Manufacturing and Mechanical Engineering in the Soviet Union,  
Library of Congress, 1953.

KLYUCHNIKOV, S. I.

PA 43/49755

USSR/Engineering  
Fuel Consumption  
Furnaces

Jan 49

"Fuel Economy in Heating Furnaces," S. I.  
Klyuchnikov, Engr, 3 pp

"Za Ekonomiyu Topliva" Vol VI, No 1

Methods to reduce fuel expenditures in drop forging are: transfer from individual blanks to scrap blank, use of blanks from a continuous roll, elimination of seams and overlapping, and use of temperature range of 1,050-1,100° C, which is 100-150° C lower than that ordinarily used.

43/49755

KLUCHNIKOV, S. I.

24940

KLUCHNIKOV, S. I. -Beskamernyy Skorochnoy Nagrev Pod Shtasovka.  
Avtomob. Prom-st', 1949, No. 8, S 22-23.

So: Letopis', No. 33, 1949.

**KLYUCHNIKOV, E.A.; MANSUROV, A.M.; KHRZHAMOVSKIY, S.N., doktor tekhnicheskikh nauk, professor, rezensent; BOZANCY, B.V., kandidat tekhnicheskikh nauk, redaktor.**

**[Mechanization of forge shops] Mekhanizatsiya v kuznechnykh tsakhakh. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. i sudostroit. lit-ry, 1954. 294 p. (Forging) (MLRA 7:6)**

KLYUCHNIKOV, S. I.

USSR/Engineering - Production methods

Card : 1/1 Pub. 128 - 29/32

Authors : Klyuchnikov, S. I.

Title : Problem concerning the capacity of a machine to produce forged pieces, and the charging factor of forging equipment.

Periodical : Vest. mash. 34/7, 83 - 89, July 1954

Abstract : The charging and production capacity of forging machines was investigated. Forging of individual pieces and machine components is described, and the production capacity per man hour, is tabulated. Graphs; tables.

Institution : ...

Submitted : ...

12 JOURNAL, S. I.

USSR/ Engineering - Metal patterning

Card 1/1 Pub. 128 - 20/31

Authors : Klyuchnikov, S. I., Engineer

Title : Rational laying out of metal in foundries

Periodical : Vest. mash. 35/5, 53-58, May 1955

Abstract : Different economical methods are introduced for proper patterning of metal in foundry plants. Various ideas are given on maximum utilisation of the metal and elimination of waste. Tables; graphs; drawings.

Institution : .....

Submitted : .....

KLYUCHNIKOV, S.I.; KHRESHAMOVSKIY, S.N., doktor tekhnicheskikh nauk, professor,  
retsensent; KHISHOVA, V.A., inzhener, redaktor; MATVEYEVA, Ye.N.,  
tekhnicheskij redaktor.

[Progressive practice in forge shops] Peredovoi opyt v kuznechnykh  
tsakhakh. Moskva, Gos.mashino-tekhn.izd-vo mashinostroit. lit-ry,  
1956. 294 p. (MIRA 9:6)

(Forging)

*KLUCHNIKOV, S. I.*

Increasing Labor Productivity in Machine Building (Voprosy povysheniya proizvoditel'nosti truda v mashinostroenii) Gosudarstvennoye nauch-tekh. izdat. mashinostroitel'. literatury, Moscow, 1957. 511 pp.  
m (Table of Contents authors below)

This collection presents a comparative tech. and economic analysis of most effective methods and industrial processes for obtaining high labor productivity in machine building. Output may be stepped up by further standardization of machine tools, materials, and production methods; drawing on unused potentials. Covers all stages of planning and production as performed in modern plants of USSR, actual experience, and new methods are discussed.

KLUCHNIKOV, S. I., "Selection of Manufacturing Methods For Hot-Pressing Blanks," p. 264.



*KLYUCHNIKOV, S.I.*

14

PHASE I BOOK EXPLOITATION SOV/5789

**Nauchno-tekhnicheskaya konferentsiya po razvitiyu proizvoditel'nykh sil Kiyevskogo ekonomicheskogo rayona**

**Goryachaya obrabotka metallov; trudy konferentsii. vyp. 2. (Hot Working of Metals; Transactions of the Scientific Technological Conference on the Development of the Productive Forces of the Kiev Economic Region. no. 2) Kiev, Izd-vo AN UkrSSR, 1960. 142 p. 1000 copies printed.**

**Sponsoring Agency: Akademiya nauk Ukrainakoy SSR. Sovet po izucheniyu proizvoditel'nykh sil UkrSSR. Institut liteynogo proizvodstva. Sovet narodnogo khozyaystva Kiyevskogo ekonomicheskogo rayona. Tekhniko-ekonomicheskij sovet.**

**Editorial Board: Resp. Ed.: A.A. Gorshkov, Corresponding Member, Academy of Sciences UkrSSR, D.B. Telsin, Engineer, and V.A. Novikov, Engineer; Ed. of Publishing House: T.K. Resnaisk; Tech. Ed.: O.A. Kadashovich.**

**PURPOSE:** This collection of articles is intended for technical personnel in machine plants and planning organizations, scientific workers, and teachers in technical schools of higher education.

Card 1/6

Hot Working of Metals (Cont.)

507/5787

COVERAGE: The book is devoted to problems of the introduction of advanced technology and processing in founding and pressworking. Problems in powder metallurgy are also analyzed. No personalities are mentioned. References accompany some of the articles. There are 56 references, mostly Soviet.

TABLE OF CONTENTS:

Foreword

Gerasimov, A.A. [Corresponding Member of the Academy of Sciences USSR, Institute liternogo proizvodstva AN UkrSSR - Institute of Founding of the Academy of Sciences UkrSSR]. Principal Trends in Improving Foundry Techniques 3

Zharov, N.T. [Candidate of Technical Sciences, Institut avtomatiki Gosplana UkrSSR-Automation Institute of the State Planning Committee of the UkrSSR]. The Present State and Outlook for Automation in Founding 15

Card 2/6

PHASE I BOOK EXPLOITATION

SOV/4028

Klyuchnikov, Sergey Ivanovich

Povysheniye tochnosti pokovok (Increasing the Accuracy of Forgings)  
Moscow, Mashgiz, 1960. 432 p. Errata slip inserted. 7,000  
copies printed.

Reviewer: A.V. Rebel'skiy, Candidate of Technical Sciences; Ed.:  
M.A. Snopkov, Engineer; Ed. of Publishing House: A.I. Sirotin;  
Tech. Ed.: L.P. Gordeyeva; Managing Ed. for Literature on Heavy  
Machine Building (Mashgiz): S.Ya. Golovin, Engineer.

PURPOSE: This book is intended for engineers and technicians working  
in forging departments. It may also be useful to students in  
technical schools of higher education.

COVERAGE: The author presents material on the processes of making  
high-accuracy forgings. Information is given on thorough heating  
and on various methods of increasing accuracy in hot die-forging,  
upsetting and extrusion, in rolling-out, cross rolling, gear  
rolling, and sizing. Methods for the improvement of accuracy in

Card 1/4

# Increasing the Accuracy of Forgings

SOV/4028

forging are treated separately. No personalities are mentioned. There are 46 references: 36 Soviet, 3 German, 6 English, and 1 French.

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# Increasing the Accuracy of Forgings

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8/182/60/000/010/008/015/XX  
A161/A030

AUTHOR: Klyuchnikov, S.I.

TITLE: Hot Multiposition Stamping

PERIODICAL: Kuznechno-shtampovochnoye proizvodstvo, 1960, No. 10, pp. 10 - 14

TEXT: The article is a review of existing multiposition stamping equipment in the USSR and other countries. Detailed design description is illustrated by drawings. The Soviet equipment is as follows: A semi-automatic die for valves and parts in the form of a rod with head (Fig. 1), which is used at a plant in the Urals and has raised the work productivity 8 - 10 times. The main function in it has an immobile round bed die (1) with cogs on the outside, being turned periodically by the mobile die encompassing it. There are eight bores in the round stationary die, with alike inserts (21) that are replaceable for different work lengths. The inserts rest on a brake disk (6) with three springs (20) exerting pressure upon it. A hole of 90 mm diameter is provided in the brake disk through which the die inserts are replaced in turns. A heated blank is laid on the shelf of the blank receiver (7), rolls down by gravity, thrusts at the upper tooth of the stopper (8) and assumes the horizontal position; the mobile bed die moves (rotates), and the

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## Hot Multiposition Stamping

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A161/A030

pusher (19) exerts pressure on the counterweight (9) and turns the stopper (8) clockwise. The upper tooth of the stopper releases the blank and it falls on the bottom tooth of the stopper opposite the receiving groove. Then, at the next move of the rotary bed die, the blank comes into the groove; the turning tooth of the die engages a tooth on the round die, turns it counterclockwise and puts it into position for the first operation (collecting metal). The stopper passes the next blank. In this way, the blanks move together with the groove. Two free grooves are alternately cooled by water at every machine stroke. Finished forgings are ejected by the pusher (14) actuated by the rod (10) being pushed by the main machine slide, and the lever (11). The punch for the third operation is spherical and moves metal into the flange portion of the forging that is difficult to fill, which lessens load on the punch in the fourth operation. Another Soviet device for automatically moving blanks from one die impression into other in a vertical direction is stamping with upsetting (Fig. 2) (this device has been designed by Engineer G.A. Kovtunenka). Tongs (9) and (10) in the machine throat move hot blanks and are moved by an eccentric shaft and two pairs of rods, one pair displacing the tongs and the other closing and opening by means of sliders with a T-groove (for guiding). The tongs are switched off automatically if blanks get in between die impressions, so as to prevent breakage. The device has fully automated

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## Hot Multiposition Stamping

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the process of stamping measured blanks, and one ready stamping is obtained with every machine stroke. The machine output was raised 10 - 12 times. The Moskovskiy zavod malolitrzhnykh avtomobiley, MZMA (Moscow Low-Displacement Automobile Plant) has a press for two-positional extrusion stamping of valves (Fig. 3). A blank moves from the hopper (1) into an induction heater, and on by the chute (2) into the opening in the loading pusher (3) which is being moved to and from by an air cylinder. At the end of its travel the pusher drops the blank into the first die impression, and in back travel a stop on the piston rod actuates a limit switch to switch on the press. The press cannot be switched on if a blank sticks in the pusher, for its top end will meet the stop planks (7) and the piston rod will not return into the start position. The stamping is produced by punches (6) fixed on the slider (5); stampings are ejected from the die with the ejector (4). An automatic reloading mechanism (Fig. 4) on this press (8 in Fig. 3) moves the blank from the first (swaging) into the second (extruding) die impression, and out of the second impression into chute. The device has "mechanical hands" (1) working simultaneously. They are driven by three air cylinders: a cylinder (2) for turning and (3) lifting, and two cylinders (4) for closing and opening the grip. The cylinder (3) has a gear on the outside and is turned by the rack-rod (5) of the cylinder (2), and turned back by the spring (6). All manipulations are blocked

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S/182/60/000/010/008/015/XX  
A161/A030

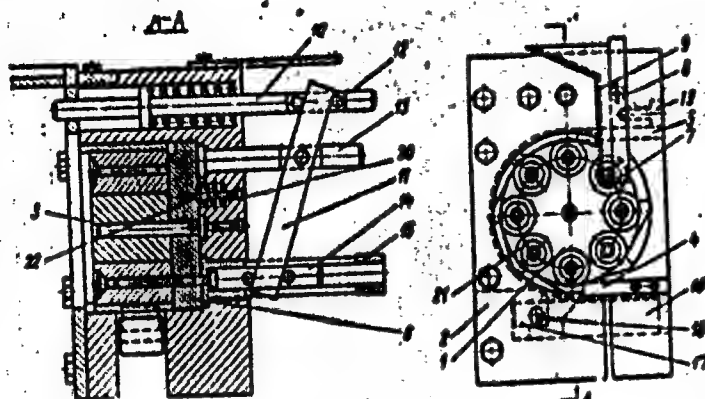
# Hot Multiposition Stamping

by limit switches. The bed die is lubricated automatically after every press stroke. All mechanisms are controlled by a command-controller. The foreign equipment described is: an automatic extrusion press of the U.S. company Klirring (Russian transliteration); a device used by Oldsmobile Company, and a transfer machine produced by Wagner (West Germany) for multiposition stamping of bearing races (Fig. 5). It is mentioned that the "Orgatankinprom" institute has developed an automatic line project for Novosibirskiy instrumental'nyy zavod (Novosibirsk Tool Plant) for rolling and multiposition-stamping of adjustable wrenches on a crank type forging press. The transfer of blanks heated to 1,200°C from one position to another in a three-position die is carried out by automatic gripping devices. The shaping of blank is simultaneous in all three die impressions - the rough, final and trimming, and one forging are produced in every press stroke, or actually two parts in every stroke for blanks are stamped by pairs. The work capacity of the press is 1,200 pieces per hour. There are 6 figures and 2 references one of which is German and one English.

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Hot Multiposition Stamping

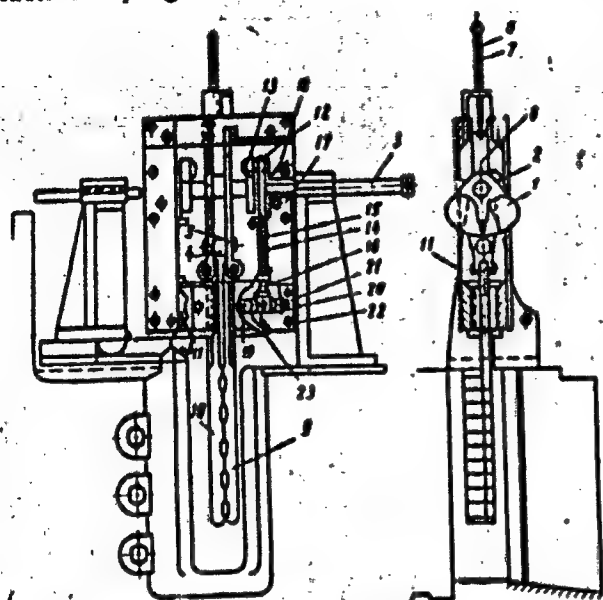
Figure 1:



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Hot Multiposition Stamping

Figure 2:

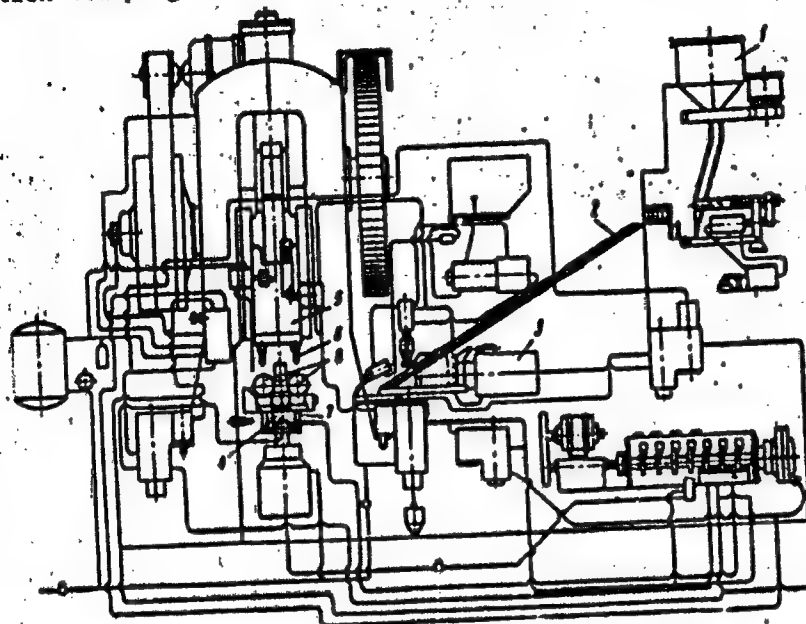


S/182/60/000/010/008/015/XX  
A161/A030

Card 6/9

Hot Multiposition Stamping

Figure 3:



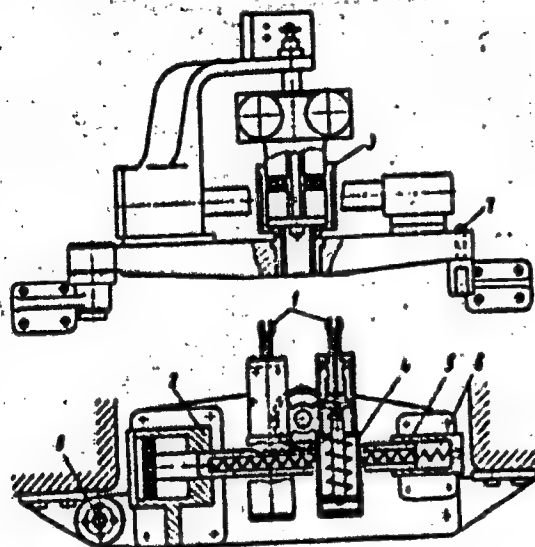
Card 7/9

Hot Multiposition Stamping

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A161/A030



Figure 4:

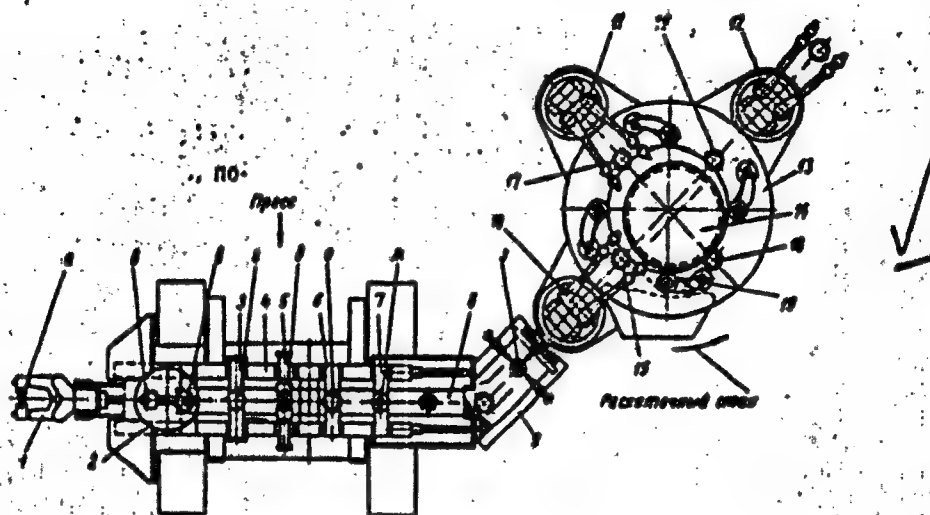


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Hot Multiposition Stamping

Figure 5:

S/182/60/000/010/008/015/XX  
A161/A030



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S/117/60/000/012/009/022  
A004/A001

AUTHOR: Klyuchnikov, S. I.

TITLE: Welded Forgings

PERIODICAL: Mashinostroitel', 1960, No. 12, pp. 26-28

TEXT: The author enumerates the advantages of the new method of dismembering forgings of complex configuration into several parts and joining them in one piece with pressing them in one piece with great allowances for subsequent mechanical working. The individual sections of such parts are forged separately according to the necessary configuration, and by subsequent welding great savings in metal are obtained. Three particular examples are described: dropforged-welded,

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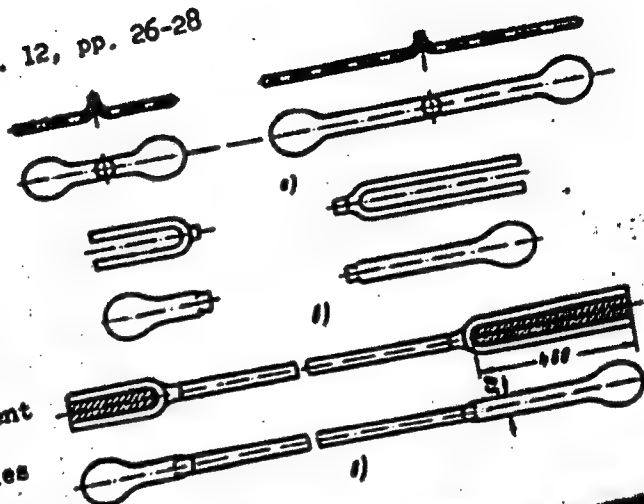
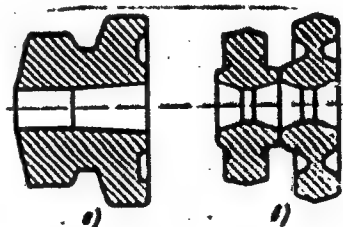


Figure 1:

S/117/60/000/012/009/022  
A004/A001

# Welded Forgings

forged-welded, and pressed-welded structures. Figure 1 shows the technological process of drop-forging three parts of a brake rod, 1,750 mm in length and 40 mm in diameter, which are then joined on the butt-welding machine. This new manufacturing method made it possible to do away completely with the mechanical working of the small brake-rod lug, while the strength characteristics of the component are fully preserved, which is proved on the tension testing machine. The new method cuts down metal consumption by 27.5 kg and saves 48 norm-hours per part. Figure 2 shows a) the monolithic forging and b) the drop-forged and welded structure of a block gear, as it is produced at the Chelyabinskiy traktorny zavod (Chelyabinsk Tractor Plant). Each part is drop-forged in an individual die, then the parts are joined by submerged arc welding. Tests showed that at a tensile stress in the range of 6375 - 9500 kg, in 10 out of 11 cases the rupture does not take place at the welding spots. Also in the manufacture of valves and other fittings welded drop-forged parts are used to an increased extent. The author cites the example of a valve box intended for 40 at



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A004/A001

# Welded Forgings

pressure, which is assembled from several parts welded together. Thus valve boxes with bores of up to 100 mm can be manufactured on automatic welding lines. In this connection the author mentions a large-scale automatic line for the manufacture of welded drop-forged chains 19-40 mm in diameter. This line has been developed by the Tsentral'nyy byuro kuznechno-pressovogo mashinostroyeniya (Central Office for the Construction of Forging and Pressing Equipment), TsBM. The half-links drop-forged on forging automatics are automatically welded, deburred, heat-treated and checked. The author points out that the US firm Park Drop Forge Co. has developed a new method of manufacturing welded drop-forged crankshafts with 4 - 16 cranks. The individual parts of the crankshafts are drop-forged separately and then welded together. Large-size forged-welded structures, like high-pressure vessels, crankshafts, generator shafts and others are now produced from individual forged parts and then joined by the new electric slag welding method developed by the Institut AN USSR (Institute of the AS of the UkrSSR). Thus, e. g. the shell of the turbine shaft for the Novosibirsk GES was forged from a hollow ingot on a hydraulic press of 10,000 tons capacity with one heating operation instead of six heatings necessary for solid shafts. Billeting of the ingot, upsetting with piercing and rolling out operations were eliminated which reduced labor consumption from 18.5 to 3.5 press hours. The Leningradskiy metallicheskiy zavod (Leningrad Metallicheskiy

Card 3/4



KLYUCHNIKOV, S.I.

[New features in the technique of manufacturing forged  
pieces] Novoe v tekhnologii izgotovleniia pokovok. Mo-  
skva, Mashgis, 1961. 279 p. (MIRA 17:9)

8/129/61/000/004/003/012  
E073/E535

**AUTHOR:** Klyuchnikov, S. I., Engineer

**TITLE:** Oxidation Free Heating of Metal for Forging and Stamping

**PERIODICAL:** Metallovedeniye i termicheskaya obrabotka metallov,  
1961, No.4, pp.15-19

**TEXT:** There are two designs of flame furnaces for oxidation-free heating: 1) In one the product of incomplete combustion of the fuel from the chamber flows in a regenerator or recuperator, pre-heating the secondary air to 800-1000°C. Following that, the secondary air flows into the chamber for incomplete combustion, ensuring heating of the metal without scale formation. 2) The products of incomplete combustion from the chamber flow into a second chamber where combustion is completed and a high temperature is generated; the heat is then directed into the working chamber through the roof of the furnace. In this case the total heat inflow into the working chamber enables obtaining a temperature of 1300 to 1400°C. In TsNIITMASH an experimental furnace for oxidation-free heating with two high-refractory recuperators has been designed. The furnace is fired with town gas. The furnace bottom area is 1 m<sup>2</sup>; the air is heated to 800-1000°C; at lower temperatures oxidation-free heating is possible if instead of air

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Oxidation Free Heating of Metal.... E073/E535

50 to 70% oxygen is used and in this case either the oxygen is heated or an oxygen-air mixture. For oxidation-free heating of steel to 1150-1200°C the excess air coefficient should be 0.4. The simplest furnace of the above mentioned second type is one with two roofs, one above the other; the gas flows into the lower (working) chamber. The products of incomplete combustion from this chamber are injected into the top chamber (secondary combustion) together with air that had been pre-heated in the recuperator. There it completes its combustion and generates a high temperature. The heat is then transmitted through the roof into the bottom, working chamber. This heat, as well as the heat entering with the pre-heated air, ensures heating of the metal to 1150-1200°C with incomplete combustion of the fuel. Royce Electrical Furnaces apply two-chamber furnaces with a recuperator for oxidation-free heating of high-speed steel blanks in flame furnaces. Experiments have shown that for a gas/air ratio higher than 2.4, there will be no scale formation but scale will form if the ratio is below 2.2. In the case of furnaces up to 1.25 m wide, the incompletely burned fuel components can continue combustion in carborundum radiating tubes,

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E073/E535

Oxidation Free Heating of Metal....

which are placed into the working space. Various non-Russian furnaces are mentioned, for instance, the furnace with a lithium protective atmosphere installed at the Oldsmobile Plant (USA) and a furnace with molten glass as the heat transfer medium (Hal Tate Furnaces, USA). OKB "Elektropech'" has developed for production a two-chamber vacuum furnace for electric heating up to 1200°C (OKB-761, OKB-761) and up to 1300-1500°C (OKB-761A). The furnace is intended for heat treatment but can also be adapted for heating components prior to precision forging. The active space is 1190 mm long, 1050 mm wide, 200 mm high. The same plant is also producing a carousel resistance furnace with bottom diameters of 1800 and 1550 mm, respectively, and a width of the rotating bottom of 400 and 250 mm with productivity values of 350 and 120 kg/hour. The furnaces are designed to heat metal to temperatures up to 1270°C inside a protective atmosphere. The temperature is automatically controlled in each thermal zone of the furnace. The Novosibirskiy zavod elektrottermicheskogo oborudovaniya (Novosibirsk Works for Electrothermal Equipment) has started the production of such furnaces. The data given in the

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Oxidation Free Heating of Metal..... S/129/61/000/004/003/012  
E073/E555

paper indicate that the problem of oxidation-free heating of the metal in flame and electric resistance furnaces can be considered solved. There are 2 figures, 1 table and 4 references: all non-Soviet.

ASSOCIATION: VNITipribor

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S/182/61/000/003/006/009  
A161/A133

AUTHOR: Klyuchnikov, S. I.

TITLE: Forging and stamping of cast iron

PERIODICAL: Kuznechno-shtampovoye proizvodstvo, <sup>3</sup> no. 3, 1961, 19-23

TEXT: The data of Soviet and foreign studies are generalized and technological recommendations are given concerning the forging, stamping and "liquid stamping" (in dies) of different cast iron types - with spheroidal graphite, white, and grey. Spheroidal graphite iron forging has been studied at TsNIIIMASH, under the supervision of Ye. P. Unkov and Doctor of Technical Sciences I. V. Kudryavtsev. It has been revealed that such iron containing less than 0.1% P withstands high deformation in the 1,040 - 840°C range, can be reduced up to 9 times in forging, up to 50% in rolling, and that pressure-working raises the strength of high-strength iron 1.5 - 2 times, along the direction of deformation at slight deformation degrees (the reduction factor being equal to 2). Cast billets could be reduced by 40 - 50% even at a higher P content (p to 15%); the C content should be 3.2 - 3.6%; annealed forgings have 3 - 4 times higher elongation and impact resistance in radial direction, and 10 - 20% lowered strength. Burnishing raises the fatigue

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A161/A133

## Forging and stamping of cast iron

resistance. Reference is made to non-Soviet information [Ref. 2: Foundry, July 1954, no. 7] on the hot forging of "mikhhanite" cast iron (with laminar graphite) proving that mechanical properties of "mikhhanite" could be improved by hot forging. Professor O. I. Pogodin-Alekseyev studied the pressure working of white cast iron with 2.23% C, 0.52% Mn, 1.39% Si, 0.12% P and 0.03% S with clearly dendritic pearlite-cementite initial structure, and found a temperature zone (900 - 950°C) where white cast irons have the highest plasticity. It is recommended to heat such iron for not longer than 10 - 15 min before forging and to use light strokes to prevent cracks. It could be upset to not above 2/3 of the initial billet height or pressed to 75%. The graphite content in all specimens plastically deformed after hardening in hot media rose several times above the content in specimens that had not been subjected to plastic deformation. P. P. Rudenok at Fiziko-tekhnicheskii institut AN BSSR (Physical and Technological Institute AS BSSR) studied grey and ferritic malleable iron. Grey cast iron proved not suitable for the ordinary open forging or stamping, and it is recommended to use it for hot extrusion in container on presses, which abruptly improved the plasticity and mechanical properties (due to transformation of the loose structure into a dense one, with blisters and cavities welded up, refined structure, etc.). The experiment die is illustrated. The use

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A161/A133

Forging and stamping of cast iron

of counterpressure (3 - 4 kg/mm<sup>2</sup>) from below is recommended for such extrusion to prevent cracks, and a German publication is referred to where counterpressure is also recommended [Ref. 3; Zur Warmformung von Gusseisen, Werkstatttechnik und Maschinenbau, 1958, Jg. 48, no. 6]. The U.S. practice of finishing malleable cast iron castings to size by caulking is mentioned. Molybdenum sulfide is recommended as lubricant in extrusion. Ye. I. Verbitskiy of Belorusskiy politekhnicheskiy institut im. I. V. Stalina (Belorussian Polytechnic Institute im. I. V. Stalin) studied "liquid stamping", i.e. a process consisting in pouring liquid cast iron into a die mold and holding under pressure. Liquid stamped and annealed parts have considerably higher mechanical properties than parts cast into sand chill molds. R. B. Zvenitskaya and A. M. Skhiladze [Ref. 4; Trudy Instituta metallurgii AN Ouz.SSR, vyp. IX, 1958] have also studied liquid stamping of cast iron. Technological recommendations are given. The following conclusions are drawn: 1) White cast iron for cutters, drawing dies, kitchen knives, etc. is to be forged at 1,050 - 850°C using reheatings. 2) Complex parts can be stamped or pressed from malleable iron with accurate dimensions, and annealing after machining can be shortened. 3) Hot stamping of gears, disks and other cast iron parts is feasible, particularly of high-strength iron with spheroidal graphite in view of its heat behavior and possible application of usual deformation process and equipment. Ex-

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Forging and stamping of cast iron

S/182/61/000/003/006/009  
A161/A133

trusion in closed dies, or upsetting in hoops is always to be preferred to open forging. 4) The possibility of processing cast iron parts by liquid stamping was fully confirmed and the method should be introduced in the industry without delay. 5) Hot and liquid stamping improve greatly the mechanical properties of cast iron, and some steel parts may be replaced by cast iron, or the dimensions of cast iron parts reduced. There are 5 figures and 4 references: 2 Soviet-bloc and 2 non-Soviet-bloc. The reference to the English-language publication reads as follows: Foundry, July 1954, no. 7.

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5(2)

SOV/78-4-8-36/43

**AUTHORS:**

Presnyakov, A. A., Dautova, L. I., Klyuchnikov, Ya. V.

**TITLE:**

On Some Characteristic Features of the Change of the Micro-hardness and the Crystal Structure of Brass Alloys (O nekotorykh osobennostyakh izmeneniya mikrotverdsti i kristallicheskoy struktury latuney)

**PERIODICAL:**

Zhurnal neorganicheskoy khimii, 1959, Vol. 4, Nr 8, pp 1926-1927 (USSR)

**ABSTRACT:**

Publications contain data on the anomalous changes of the properties of brass alloys in dependence on the composition and temperature (Refs 1,2,5). For this reason the author investigated the crystal structure and the micro-hardness of the brass Alloys in cast state and after different thermal processing such as annealing, tempering. The following may be concluded from the results (Figs 1,2): the maximum of the curve of microhardness of cast samples indicates transformations in solid state. The considerable decrease of the microhardness after the annealing in alloys containing more than 25% zinc indicates a "hardening" in the liquid. After deformation and annealing a regulation under the formation of a two-phase

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SOV/78-4-8-36/43

**On Some Characteristic Features of the Change of the Microhardness and the Crystal Structure of Brass Alloys**

mixture takes place in the alloys. Annealing at 800° with subsequent cooling leads to the fixation of the high-temperature state of brass alloys. Figure 3 shows the parameters of the crystal lattices. The strong scattering confirms the existence of a heterogeneity of second order in the solid solutions. In the alloys L95 - L80 the steady course of the parameters is disturbed between 200-300°. This range of disturbance agrees well with the temperature of regulation found by W. Koester and W. Schulte (Ref 5). There are 4 figures and 6 references, 4 of which are Soviet.

**SUBMITTED:** December 18, 1958

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18.5500, 18.1200

66228

SOV/126-8-3-11/33

**AUTHORS:** Presnyakov, A.A., Dautova, L.I. and Klyuchnikov, Yu.F.

**TITLE:** Homogeneous Ageing of Unsaturated Solid Solutions

**PERIODICAL:** Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 3, pp 394-399 (USSR)

**ABSTRACT:** The following simple brasses were investigated: L95, L90, L85, L80, L75, L70, L65 and L60; and the following aluminium bronzes: Br.A1, A2, A3, A4, A5, A6, A7, A8, A9 and A10. All the above alloys were made from copper, MO, aluminium A00 and zinc TsV. The alloys were prepared for X-ray investigation as follows: rods of 18 mm diameter and 120 mm length were cast and forged (initial forging temperature 800°C) to a degree of deformation of approximately 30%. From the forged rods cylindrical "tumblers" were cut. The thickness of their base was 1.5 to 2 mm and their external surface (used for X-ray investigation) was ground and polished. The specimens were then annealed in air at 800°C for 6 hours. After annealing, the working surface was ground, polished and etched with nitric acid in order to remove the work-hardened layer. X-ray pictures were taken using a Cu-K<sub>α</sub> irradiation. In the X-ray pictures, the interference spots

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**Homogeneous Ageing of Unsaturated Solid Solutions**

from the planes (420) and (331) were fixed by an exposure of 45 minutes. The specimen was placed in the electric furnace and remained immobile during exposure. It was heated to 20, 100, 200, 250, 300, 350, 400, 450 and 500°C and the temperature was regulated within 10 to 20°. In Fig 1, X-ray photographs of solid solutions are shown: a - L80, first X-ray exposure after annealing; б - L80, repeated X-ray exposure after storage; B - Br A5, first X-ray exposure after annealing; 2 - Br A5, repeated X-ray exposure after storage. In Fig 2, X-ray pictures of alloys with "incomplete recrystallization" are shown: a - L90; б - Br A2. Fig 3 shows X-ray pictures of brass specimens quenched from 800°C in water after annealing for 6 hours: a - brass L70, immediately after quenching; б - brass L90, after quenching and ageing. Fig 4 shows "recrystallization" after ageing of the alloy Br A2 (400°C). The authors arrived at the following conclusions: (1) Homogenization ageing in unsaturated solid solutions has been observed. This is not accompanied by a change in the phase composition of the alloy or by precipitation of excess

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**Homogeneous Ageing of Unsaturated Solid Solutions**

phases. It results in a very great refining of the mosaic-block structure and the disorientation of the mosaic blocks relative to each other. (2) The occurrence of ageing in solid solutions having undergone hot deformation and subsequent annealing testifies to the "quenching" of the high temperature state of the crystal structure of the alloy on slow cooling. (3) The refinement of the blocks during the ageing process and their recrystallization at elevated temperatures shows that for various temperature conditions equilibrium mosaic structures exist, towards which the alloy tends under all conditions, including that of room temperature. (4) The "ageing" process of solid solutions is reversible. The rate at which the reverse process occurs will be greater, the greater the rate of the direct process. (5) The homogeneous ageing process is preceded by the closest ordering of solid solutions. This seems to explain the low rate at which it takes place. There are 4 figures, 1 table and 16 references, 15 of which are Soviet and 1 German.

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Homogeneous Ageing of Unsaturated Solid Solutions SOV/126-8-3-11/33

ASSOCIATION: Institut yadernoy fiziki AN KazSSR (Institute of  
Nuclear Physics AS KazSSR)

SUBMITTED: August 26, 1958 (initially)  
November 27, 1958 (after revision)

Card 4/4

S/126/60/010/005/007/030  
E073/E435

AUTHORS: Presnyakov, A.A., Dautova, L.I. and Klyuchnikov, Yu.P.  
TITLE: On Anomalies in the Electric Resistance of Brasses and  
Aluminium Bronzes ✓  
PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol.10, No.5,  
pp.676-680

TEXT: Earlier work (Ref.10) related to phenomenon of homogeneous ageing of unsaturated solid solutions and also (Ref.11) to investigation of the changes in the crystal structure of brasses with temperature and microhardness after various heat treatments. Particularly, the anomalous temperature dependence of the crystal lattice parameter of the brass in the temperature range 200 to 300°C was observed when an increase in temperature did not result in an increase of this parameter but in constancy or even a decrease. This fact, and also the character of the microhardness changes with temperature, led to the conclusion that ordering takes place in Cu-Zn  $\alpha$ -solutions and particularly that ordering also explains the homogeneous ageing. In this paper, a continuation of this work is described which was devoted to investigating the kinetics of the process of ordering of  $\alpha$ -solutions of Cu-Zn and  
Card 1/4 ✓

S/126/60/010/005/007/030  
E073/E435

On Anomalies in the Electric Resistance of Brasses and Aluminium Bronzes


Cu-Al. Alloys containing 5, 10, 15, 20, 25, 30 and 38% Zn and 1, 2, 3, 4, 5 and 6% Al were investigated, determining the dependence of the specific resistance on temperature and duration of tempering of quenched specimens. The brass specimens were in the form of 2 mm diameter wires and the Al bronze specimens were in the form of 1 x 10 x 200 mm strips. The wire (500 mm long) was wound into a spiral. Twin copper conductors were welded on, by arc welding, to the ends of the spirals and the strips for the purpose of connection to the supply and potentiometric terminals of the bridge; this enabled carrying out heat treatment without it being necessary to re-solder the leads. The resistance was measured with a double Thomson-Wheatstone bridge of an accuracy of 0.05%. For eliminating oxidation during heat treatment, the specimens were coated with a layer of liquid glass. Quenching was in iced water after soaking for 45 min at 800°C. The quenched specimens were subjected to tempering at 100, 200, 300, 400, 500 and 600°C for durations of 10 min to 12 hours, followed by air

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S/126/60/010/005/007/030  
R073/E435

**On Anomalies in the Electric Resistance of Brasses and Aluminium  
Bronzes**

cooling. Fig.1 to 4 show the curves of the relative changes in the resistance as a function of temperature and tempering time, taking as 100% the electric resistance of the quenched specimens. Fig.5 gives the dependence of the specific resistance of Cu-Zn alloys on the composition for various states (after 80% deformation, after annealing for 1 hour at 600°C and after quenching from 800°C). The following conclusions are arrived at:

- 1) Analysis of the changes of the electric resistance of brasses as a function of the tempering temperature confirms the presence in these of the process of ordering.
  - 2) The maximum ordering manifests itself for a Zn content of 10 and 30 wt.%.
  - 3) The process of ordering is preceded by the occurrence of the K-state in the case of long duration annealing of quenched alloys at 200 to 300°C, which then changes into ordinary ordering, the maximum degree of development being achieved at 400°C. Tempering at 500°C and above leads to the formation of a complete disorder
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S/126/60/010/005/007/030  
E073/E435

On Anomalies in the Electric Resistance of Brasses and Aluminium  
Bronzes

state of the brasses.

4) Occurrence of the K-state and of ordering also occurs in  
Al bronzes.

There are 5 figures and 14 references: 8 Soviet and 6 Non-Soviet.

ASSOCIATION: Institut yadernoy fiziki AN KazSSR (Institute of  
Nuclear Physics AS KazSSR)

SUBMITTED: February 20, 1960 (initially)  
June 5, 1960 (after revision)

Card 4/4

**PRESNYAKOV, A.A.; CHERVYAKOVA, V.V.; NOVINOV, A.V.; KLYUCHNIKOV, Ya.P.**

**Role of lead in leaded brass. Tsvet. met. 33 no.7:77-81 J1 '60.  
(Brass--Metallurgy) (Lead)**

PHASE I BOOK EXPLOITATION

801/5690

23

Akademiya nauk Kazakhskoy SSR, Institut yadernoy fiziki.

Metallovedeniye i obrabotka metallov davleniyem (Physical Metallurgy and Pressworking of Metals) Alma-Ata, 1961. 183 p. (Series: Trudy Instituta yadernoy fiziki, t. 4) 2,450 copies printed.

Resp. Eds.: I. O. Gritman and A. A. Presnyakov; Resp. Secretary: V. V. Chervyakova;  
Eds.: M. Ya. Brailovskaya and F. I. Shevchuk; Tech. Ed.: E. P. Borokina.

PURPOSE: This book is intended for scientific research workers, technical personnel in industry and students and aspirants interested in problems of physical metallurgy and the pressworking of metals.

COVERAGE: The book, Volume IV of the Transactions of the Institute of Nuclear Physics, Academy of Sciences Kazakh SSR, contains papers reviewing problems of physical metallurgy. Attention is given to a consideration of metal ductility, strength, phase transformation, and the ordering of various alloys, and to a discussion of the diffusion mechanism of the plasticity. Experimental findings concerning strength, deformation, and external friction in the working of non-ferrous metals and alloys are included in papers dealing with metal rolling.

Card 1/6



Physical Metallurgy and Pressworking of Metals

807/5670

Problems of automatic inspection and control of multiaxial wire-drawing frames are also considered. Most of the papers are accompanied by references, the majority of which are Soviet.

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